

C2
Sub 1
C1

3. (Amended) The solar cell as set forth in claim 2, wherein the rectification barrier is the shottky barrier being formed by contacting the titanium dioxide semiconductor with at least one of said pair of electrodes.

4. (Amended) The solar cell as set forth in claim 2, wherein the rectification barrier is the PN junction being formed by contacting the titanium dioxide semiconductor with at least one of said pair of electrodes.

REMARKS

Claims 1-8 and 10-30 are pending in this application. Claims 25-30 have been withdrawn from consideration. By this Amendment, claims 1 and 3-4 are amended and claim 9 is canceled. Reconsideration in view of the above amendments and the following remarks is respectfully requested.

The attached Appendix includes a marked-up copy of each rewritten claim (37 C.F.R. §1.121(c)(1)(ii)).

Applicants gratefully acknowledge that the Office Action indicates that claims 11-13 and 23-24 contain allowable subject matter.

RESTRICTION REQUIREMENT

The Office Action indicates that claims 25-30 have been withdrawn from consideration as being directed to a non-elected invention. Although Applicants elected Group I, claims 1-24 in the Response to Restriction Requirement filed on June 3, 2002, Applicants assert that the Restriction Requirement was improperly issued.

Specifically, Applicants respectfully assert that [this application is a national stage application based on an international PCT application. Restriction practice under 35 U.S.C. §121, as it applies to national stage applications submitted under 35 U.S.C. §1.111(a), is not applicable to either international or national stage applications. National stage applications

based on international PCT applications must be examined under the unity of invention requirements of the PCT as set forth in 37 C.F.R. §1.475 and §1.499.]

Applicants respectfully assert that Group I (claims 1-8 and 10-24) and Group II (claims 25-30) are directed to a semiconductor device including at least a titanium dioxide semiconductor disposed between a pair of electrodes, the titanium dioxide semiconductor being formed with pores. Therefore, because the claims of Group II have a technical relationship involving one or more of the same or corresponding special technical features of the claims of Group I, the claims of Group I and Group II comply with the unity of invention requirements of the IPO. Thus, because both Group I and Group II must be examined in a single application under the unity of invention requirements, Applicants respectfully request that the Restriction Requirement issued on May 3, 2002 be withdrawn.

OBJECTIONS

The Office Action objects to claims 3 and 4 under 37 C.F.R. §1.75(c), as being of improper dependent form. Applicants amend claims 3-4 to correct the dependent form. Accordingly, Applicants respectfully request that the objection be withdrawn.

CLAIM REJECTIONS

The Office Action rejects claims 1, 3, 5 and 9-10 under 35 U.S.C. §102(b) as being anticipated by Saurer et al. (U.S. Patent No. 5,482,570); claims 2, 4 and 6-8 are rejected under 35 U.S.C. §103(a) as being unpatentable over Saurer; and claims 14-22 are rejected under 35 U.S.C. §103(a) as being unpatentable over Saurer in view of Shiratsuchi et al. (U.S. Patent No. 6,084,176). Applicants respectfully traverse the rejections.

In particular, Applicants respectfully assert that neither Saurer nor Shiratsuchi disclose or suggest a solar cell including at least a titanium dioxide semiconductor which is disposed between a pair of electrodes, the titanium dioxide semiconductor having a fractal

structure and defining a surface and an interior, the surface and the interior of the titanium dioxide semiconductor being formed with pores, as recited in independent claim 1.

Specifically, Saurer discloses a photovoltaic cell 1 which includes a first electrode 6 and a second electrode 10 spaced from the first electrode 6 by a plurality of layers including at least one layer 14 of a semiconducting material. See Abstract.

In one embodiment of the photovoltaic cell 1, the first electrode 6 comprises a uniform layer 18 on which a layer of colloidal particles 20 of the same material as the first electrode 6 is deposited by a sol-gel process. See col. 4, lines 42-47. The colloidal particles 20 are incorporated into the first layer 14. See Fig. 5.

In a second and distinct embodiment of the photovoltaic cell 1, the first electrode 6 has a rough appearance. The first layer 14 of semiconducting material closely embraces its relief. See col. 4, lines 19-22; see also Fig. 3 and 8. However, the semiconductor layer 14 does not have a fractal structure.

Shiratsuchi discloses a photoelectric conversion device having a layer of dye-sensitized nanoparticulate semiconductor and a hole transporting layer containing an organic hole transporting agent. See Abstract.

In stark contrast to Applicants' claimed invention, neither Saurer nor Shiratsuchi discloses a solar cell including at least a titanium dioxide semiconductor which is disposed between a pair of electrodes, the titanium dioxide semiconductor having a fractal structure and defining a surface and an interior, the surface and the interior of the titanium dioxide semiconductor being formed with pores. Although Saurer discloses a titanium dioxide semiconductor being formed with pores, the porous semiconductor does not have a fractal structure.

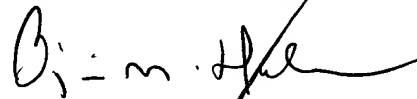
Accordingly, because Saurer does not disclose each and every feature as a claimed invention, Applicants assert that independent claims 1 and 25 define patentable subject

matter. Claims 2-8, 10-24 and 26-30 depend from the independent claims, and therefore also define patentable subject matter. Accordingly, Applicants respectfully request that the rejections under 35 U.S.C. §102(b) and 35 U.S.C. §103(a) be withdrawn.

In view of the foregoing amendments and remarks, Applicants submit that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-8 and 10-30 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number set forth below.

Respectfully submitted,



James A. Oliff
Registration No. 27,075

Benjamin M. Halpern
Registration No. 46,494

JAO:BMH/gpn

Attachment:
Appendix

Date: October 3, 2002

OLIFF & BERRIDGE, PLC
P.O. Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400

<p>DEPOSIT ACCOUNT USE AUTHORIZATION Please grant any extension necessary for entry; Charge any fee due to our Deposit Account No. 15-0461</p>
--

APPENDIX

Changes to Claims:

Claim 9 is canceled.

The following is a marked-up version of the amended claims:

1. (Twice Amended) A solar cell, comprising:

a pair of electrodes; and

a titanium dioxide semiconductor which is disposed between the electrodes,

the titanium dioxide semiconductor having a fractal structure and defining a surface and an interior, the surface and the interior of the titanium dioxide semiconductor being formed with pores, and the titanium dioxide semiconductor being arranged so as to form a rectification barrier with respect to at least one of the pair of electrodes.

3. (Amended) The solar cell as set forth in claim ~~1~~^{or} 2, wherein the rectification barrier is the shottky barrier being formed by contacting the titanium dioxide semiconductor with at least one of said pair of electrodes.

4. (Amended) The solar cell as set forth inn claim ~~1~~^{or} 2, wherein the rectification barrier is the PN junction being formed by contacting the titanium dioxide semiconductor with at least one of said pair of electrodes.